

1. (SAS) File T6-10.txt contains variables in Table 6.10 on page 345.

(1) Find two sample sizes  $n_g$  and  $n_d$ .

$$n_g = 36 \text{ and } n_d = 23.$$

(2) Find two sample mean vectors  $\bar{X}_g$  and  $\bar{X}_d$ . (Keep 5 digits after decimal point)

$$\bar{X}_g = \begin{pmatrix} 12.21861 \\ 8.11250 \\ 9.59028 \end{pmatrix} \text{ and } \bar{X}_d = \begin{pmatrix} 10.10565 \\ 10.76217 \\ 18.16783 \end{pmatrix}.$$

(3) Find two sample variance-covariance matrices  $S_g$  and  $S_d$ . (Keep 5 digits after decimal point)

$$S_g = \begin{pmatrix} 23.01336 & 12.36640 & 2.90661 \\ 12.36640 & 17.54441 & 4.77308 \\ 2.90661 & 4.77308 & 13.96333 \end{pmatrix} \text{ and } S_d = \begin{pmatrix} 4.36232 & 0.75989 & 2.36210 \\ 0.75989 & 25.85124 & 7.68573 \\ 2.36210 & 7.68573 & 46.65400 \end{pmatrix}.$$

2. Example 6.3 on page 287 gives the following information on two samples.

$$n_1 = 50, n_2 = 50, \bar{X} = \begin{pmatrix} 8.3 \\ 4.1 \end{pmatrix}, \bar{Y} = \begin{pmatrix} 10.2 \\ 3.9 \end{pmatrix}, S_x = \begin{pmatrix} 2 & 1 \\ 1 & 6 \end{pmatrix}, S_y = \begin{pmatrix} 2 & 1 \\ 1 & 4 \end{pmatrix}$$

(1) Find  $S_{\text{pooled}}$

$$S_{\text{pooled}} = \frac{n_1-1}{n-2} S_1 + \frac{n_2-1}{n-2} S_2 = \frac{S_1+S_2}{2} = \begin{pmatrix} 2 & 1 \\ 1 & 5 \end{pmatrix}.$$

(2) Find  $S_{\bar{X}_2 - \bar{Y}_2}^2$

$$S_{\bar{X}_2 - \bar{Y}_2}^2 = \frac{n}{n_1 n_2} (0, 1) S_{\text{pooled}} \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \frac{100}{50^2} 5 = 0.2$$

(3) Find a 90% confidence interval for  $\mu_{x1} - \mu_{y1}$

$$\begin{aligned} \bar{X}_1 - \bar{Y}_1 \pm t_{0.05}(98) S_{\bar{X}_1 - \bar{Y}_1} &= \bar{X}_1 - \bar{Y}_1 \pm t_{0.05}(98) \sqrt{\frac{n}{n_1 n_2} (1, 0) S_{\text{pooled}} \begin{pmatrix} 1 \\ 0 \end{pmatrix}} \\ &= 8.3 - 10.2 \pm 1.661 \times \sqrt{\frac{2}{25}} = -1.9 \pm 0.47 \\ &= (-2.4, -1.4) \end{aligned}$$

is a 90% confidence interval for  $\mu_{x1} - \mu_{y1}$ .